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COMPLETE SPECIFICATION.

Improvements in or relating to Centrifugal Oil Cleaners.

We, THE GLACIER METAL COMPANY LIMITED, a British Company, of 368 Ealing Road, Alperton, Wembley, Middlesex, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to centrifugal oil cleaners of the kind in which oil to be cleaned is fed under pressure into a drum mounted for rotation about a vertical axis within a casing, the drum being rotated by the reaction of at least one jet of cleaned oil discharging from a tangentially directed nozzle on the drum, and heavier substances separated by centrifugal action being collected and retained on the wall of the drum.

In centrifugal oil cleaners of this kind as previously proposed, all the oil which enters the drum under pressure is discharged through the reaction nozzle or nozzles and returns to a sump or tank. Thus, unless a second oil pump is employed to pump the cleaned oil to the place where it is required, the cleaner can only function as a by-pass cleaner, so that the major portion of the oil will not pass through the cleaner until it has been circulated several times through the mechanism to be lubricated, and some abrasive particles may circulate with it before their removal.

The present invention has for its object to provide an improved construction of centrifugal oil cleaner whereby all the oil passing to mechanism to be lubricated traverses the centrifugal oil cleaner so as to ensure that the oil used for lubrication will not contain any abrasive particles.

According to the present invention, in a centrifugal oil cleaner of the kind referred to, an outlet is provided for discharge from the drum of part of the cleaned oil under pressure for lubrication purposes. Oil to be cleaned may be fed to the drum and said part of the cleaned oil discharged from the drum through axial passages. An axial inlet passage may be provided in one bearing and an axial outlet passage in the other bearing of the drum. Alternatively, concentrically arranged inlet and outlet passages may be associated with one bearing, the inner passage providing the outlet extending into the drum and terminating at a point remote from the point of entry of the oil to be cleaned. A baffle may be located within the drum between the points of entry and discharge of the oil from and to the said passages. The baffle may be in the form of a disc fixed within the drum between the bearings.

The bearings may be formed with concave seatings engageable by axial projections on the drum. At least one of the bearings may be movable axially and be spring-urged in a direction towards the drum. Alternatively, the bearings may be cylindrical and the drum may be provided with stub shafts engaging the bearings, or the drum may be rotatably mounted on a stationary shaft formed with inlet and outlet passages.

In a further modification the drum may be fixed to a shaft passing through the drum and carried in journal and thrust bearings in the top and bottom of the casing.

The invention is hereinafter described, by way of example, with reference to the accompanying diagrammatic drawing, which illustrates one embodiment of centrifugal oil cleaner according to the invention.

As shown in the drawing, a centrifugal oil cleaner according to the invention may comprise a drum 1 having lower and upper spherical projections 2, 3 respectively, engaging corresponding concave seatings in bearings 4, 5 respectively, the bearing 5 being axially movable and urged by a spring 6 in a direction towards the drum 1. The

drum 1 is provided with reaction nozzles 7 open at their upper ends for receiving cleaned oil under pressure from the interior of the drum 1, the nozzles 7 having tangentially directed outlets whereby the drum 1 is rotated at high speed by reaction of jets of oil discharging through nozzles.

Oil under pressure to be cleaned is admitted through an axial passage in the lower bearing 4 and the body of oil in the drum 1 is subject to centrifugal action whereby heavier impurities, such as abrasive particles, migrate to the wall of the drum 1 and are there collected and retained.

According to the present invention, the drum 1 is provided with an outlet communicating with an axial outlet passage in the upper bearing 5 so that part of the cleaned oil under pressure within the drum 1 may be discharged for lubrication purposes.

As only a small proportion of the cleaned oil discharged from the drum passes through the nozzles 7, a greater part of the oil discharges through the axial passage in the bearing 5 and is available for lubrication purposes.

A baffle plate 8 in the form of a disc fixed within the drum between the bearings 4, 5 may be provided to ensure that oil cannot pass directly from the inlet to the outlet without first being subjected to centrifugal action.

In the construction illustrated a balance is preferably maintained by arranging that the projected area of the bottom bearing is greater than that of the top bearing to compensate for the weight of the drum and the contained oil, the arrangement being such that oil will leak from both bearings at the same time when it has reached a determinate pressure. The leakage pressure is determined by adjusting the amount by which the spring 6 is compressed. The slidable bearing 5 thus forms a pressure relief valve.

What we claim is:—

1. A centrifugal oil cleaner of the kind referred to, wherein an outlet is provided for discharge from the drum of part of the cleaned oil under pressure for lubricating purposes.

2. A centrifugal oil cleaner according to Claim 1, wherein oil to be cleaned is fed to the drum and said part of the cleaned oil discharged from the drum through axial passages.

3. A centrifugal oil cleaner according to Claim 2, wherein an axial inlet passage is provided in one bearing and an axial outlet passage in the other bearing of the drum.

4. A centrifugal oil cleaner according to Claim 2, wherein the axial inlet and outlet passages are concentrically arranged, the inner passage providing the outlet extending into the drum and terminating at a point remote from the point of entry of the oil to be cleaned.

5. A centrifugal oil cleaner according to any of the preceding claims 2 to 4, wherein a baffle is located within the drum between the points of entry and discharge of the oil from and to the said passages.

6. A centrifugal oil cleaner according to Claim 5, wherein the baffle is in the form of a disc fixed within the drum between the bearings.

7. A centrifugal oil cleaner according to any of the preceding claims, wherein the bearings for the drum are formed with concave seatings engageable by axial projections on the drum.

8. A centrifugal oil cleaner according to Claim 7, wherein at least one of the bearings is movable axially and is spring-urged in a direction towards the drum.

9. A centrifugal oil cleaner according to Claim 8, wherein the stress of said spring is adjustable.

10. A centrifugal oil cleaner according to any of the preceding Claims 1 to 6, wherein the drum is carried in cylindrical bearings and is provided with stub shafts engaging said bearings.

11. A centrifugal oil cleaner according to any of the preceding Claims 1 to 6, wherein the drum is rotatably mounted on a stationary shaft formed with axial inlet and outlet passages.

12. A centrifugal oil cleaner according to any of the preceding Claims 1 to 6, wherein the drum is fixed to a shaft passing through the drum and carried in journal and thrust bearings in the top and bottom of the casting.

13. The improved centrifugal oil cleaner, substantially as hereinbefore described with reference to the accompanying diagrammatic drawing.

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PROVISIONAL SPECIFICATION.

Improvements in or relating to Centrifugal Oil Cleaners.

We, THE GLACIER METAL COMPANY LIMITED, of 368 Ealing Road, Alperton, Wembley, Middlesex, a British Company, do hereby declare this invention to be described in the following statement:—

This invention, which is an improvement in or modification of the centrifugal oil cleaner claimed in specification No. 668,766, aims at substantially complete removal of solid abrasive particles from the oil system in an engine by centrifugal action, the bowl of the centrifuge being driven by the reaction of oil jets from nozzles rotating with the bowl and supplied with oil under pressure by the engine oil pump.

In previous proposals all the oil which entesr the bowl under pressure is discharged into atmospheric pressure, and, unless a second oil pump is employed to supply the engine, the cleaner can only function as a bypass cleaner, so that the greater part of the oil feeding the engine will not pass through the cleaner until it has been circulated through the bearings several times and abrasive particles may circulate with it before their removal.

In the construction according to the present improvement or modification it is provided that all the oil passing to the engine shall pass through the centrifuge, so that abrasive particles will be taken out in one pass.

In a practicable embodiment the bowl is rotatably mounted at top and bottom on preferably spherical seats which will eliminate any constraint due to misalignment. The pivots need not necessarily be spherical but may be conical, flat or parallel, or end thrust may be taken by ball bearings or a centre point pivot with the oil allowed to flow round it. Oil under pressure from the oil pump enters a tubular support providing the bottom seat, passing into the bowl through an aperture in the bowl, and the greater part passing out through an aperture in the top of the bowl through a slidable tubular support presenting the top seat, and through the top part of the casing, whence it is fed to the engine bearings. The slidable tubular support is normally urged downwards by a spring the stress of which is adjustable.

A part of the oil flows out through nozzles in opposite directions tangential to the rotation of the bowl which is driven at high speed by reaction. This smaller quantity of oil is returned to the sump.

A preferably circular disc is fixed within the bowl so as to ensure that all the oil passing to the engine has been subjected to considerable centrifugal action and has not followed a straight axial course.

In the embodiment under consideration a balance is maintained by suitable choice of areas of the top and bottom spherical seats, the area of the top of the slidable support and the stress of the spring. The spherical area of the bottom bearing is greater than that of the top to compensate for the weight of the bowl when filled with oil, the arrangement being such that oil will leak from both at the same time when it has reached a predetermined pressure. This pressure is determined by the adjustment of a threaded plug against which the spring abuts, the spherical seats thus forming a pressure relief system.

An outer casing providing a mount for the supports has a detachable lid so that the bowl may be readily extracted and dismantled for cleaning.

In an alternative embodiment the bowl may be rotatably mounted on a stationary spindle provided with inlet and outlet passages, the bore of the spindle being interrupted and the oil flowing through radial holes in the spindle into and out of the bowl, the top of the spindle being directly connected to the engine oil system, while the lower part of the spindle may fit into and be supported by a central boss communicating with a lateral oil inlet passage in the bottom of the casing. Or the bowl and the spindle provided with the axial inlet and outlet passages may be rotatably mounted within the casing in any other suitable manner.

In a further alternative the oil supply and return may be effected at one end only of the bowl. This alternative requires coaxial tubular passages, the inner one passing into the bowl, its open end being in the half of the bowl remote from the end at which the tubes pass into it. An advantage of the last-mentioned arrangement is that the bowl can be removed without disconnecting oil pipes.

In the examples given above it is understood that the outer casing is closed at the top end with a lid bolted to it and that large holes are provided at the base to allow the oil from the jets to drain away readily to the sump.

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723339 COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale.